Anatomy of an XML Exchange

Modules Roadmap: You Are Here

- Anatomy of an XML Exchange
- XML Conceptual Review
- Basic XML Schema for NIEM
- Advanced XML Schema for NIEM
- Substitution Groups
- Extension Schemas

Objectives Roadmap

This module supports the following course objective:

✓ **Define the physical components of an XML exchange.**

Identify basic XML components that are used in the NIEM structure.

Write and/or extend an XML schema conformant to the NIEM Naming and Design Rules (NDR).

Module Objectives

- In this module, we will review:
  - Common terminology used in XML exchanges.
  - Physical and logical elements of an XML exchange.
  - How XML exchanges integrate with existing systems.
  - Different approaches to exchange design.
  - Design considerations for security, scalability, performance and maintainability.

Common Terminology

- ***XML*** – e**X**tensible **M**ark-up **L**anguage used to define and serialize data as well as define schemas, transformation rules, web services and visual presentation.
- ***Message*** – one or more XML documents containing the data to be shared.
- ***Publisher*** – An entity / software program that initiates a "One Way" exchange.
- ***Subscriber*** – An entity / software program that receives messages in a "One Way" Exchange.

More Terms

- ***Requestor*** – An entity / software program that initiates a “Two Way” exchange.
- ***Responder*** – An entity / software program that receives “Request Messages” and returns “Response Messages” in a “Two Way” Exchange.
- ***Web Service*** – A type of program that allows a remote system (Client) to interact with a program on a local system (Server) using XML messages.

More Terms

- *XML Document (.xml)* – A file that contains actual data and conforms to the rules of XML syntax (also known as "Instance Document").
- *XML Schema Document (.xsd)* – a set of rules to which an XML document must conform in order to be considered "valid."
- *Web Service Description Language (.wsdl)* – Pronounced "wiz-dull", a document (containing XML) that describes the functionality of a Web Service. (Like a "Service Contract").

Even More Terms

- ***XML Stylesheet (.xsl)*** – An XML document that describes how XML data should be visually rendered.
- ***XML Stylesheet Transformation (.xslt)*** – An XML document that defines the rules by which a file defined by one schema is transformed (mapped) to a file defined by another schema.

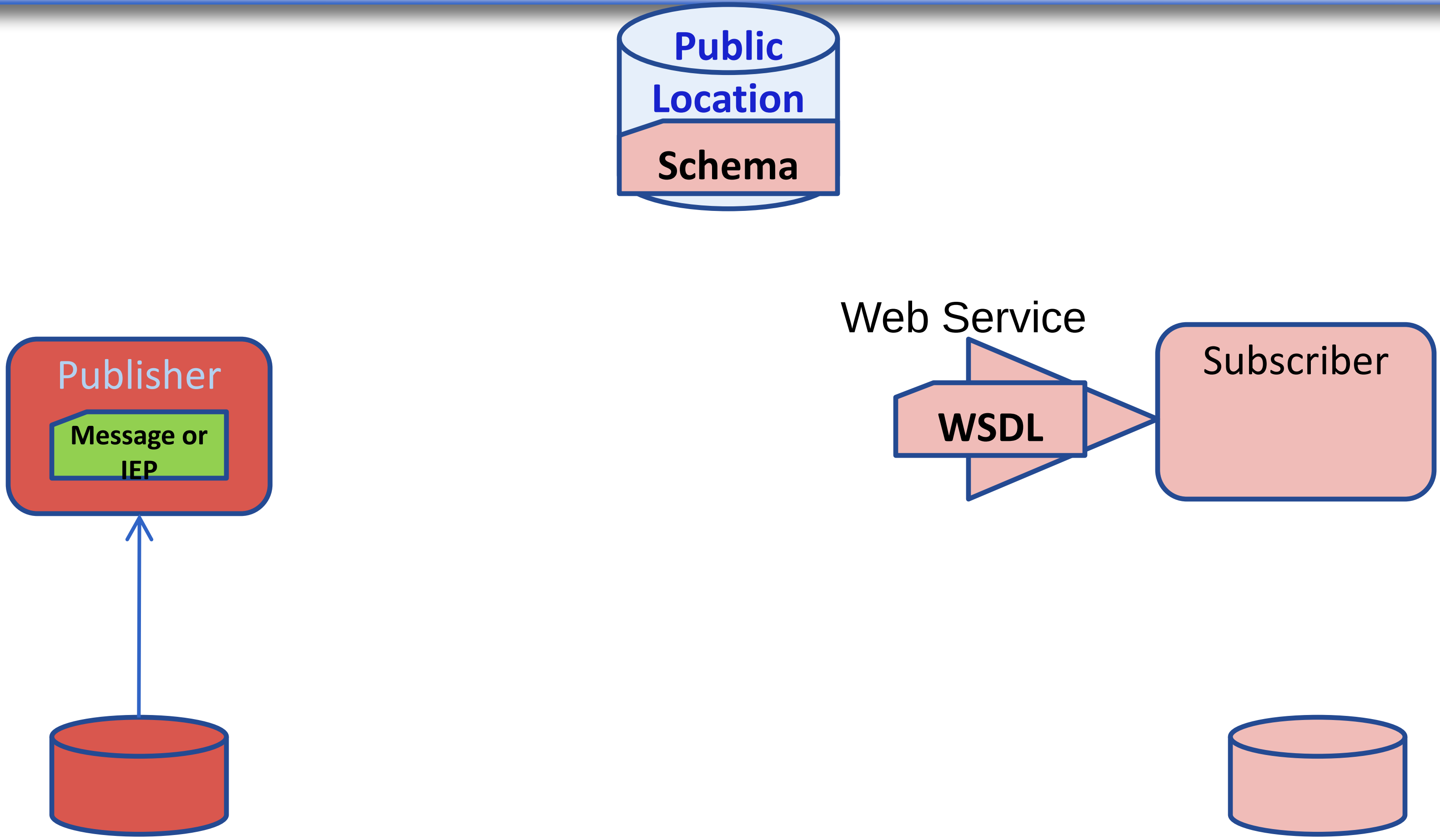
XML Message Exchange Patterns

- One-way exchange
- Publish/Subscribe exchange
- Two-way exchange (Request/Response)
- Federated Query

XML Message Exchange Patterns

- Simple "One Way" exchange pattern
  - Messages are "Pushed" by the Publisher.
  - Sent directly to one (1) Subscriber.
  - Can be transactional or batch.
  - Transport neutral (Web Service, FTP, E-mail, etc.).
  - Protocol Acknowledgements.

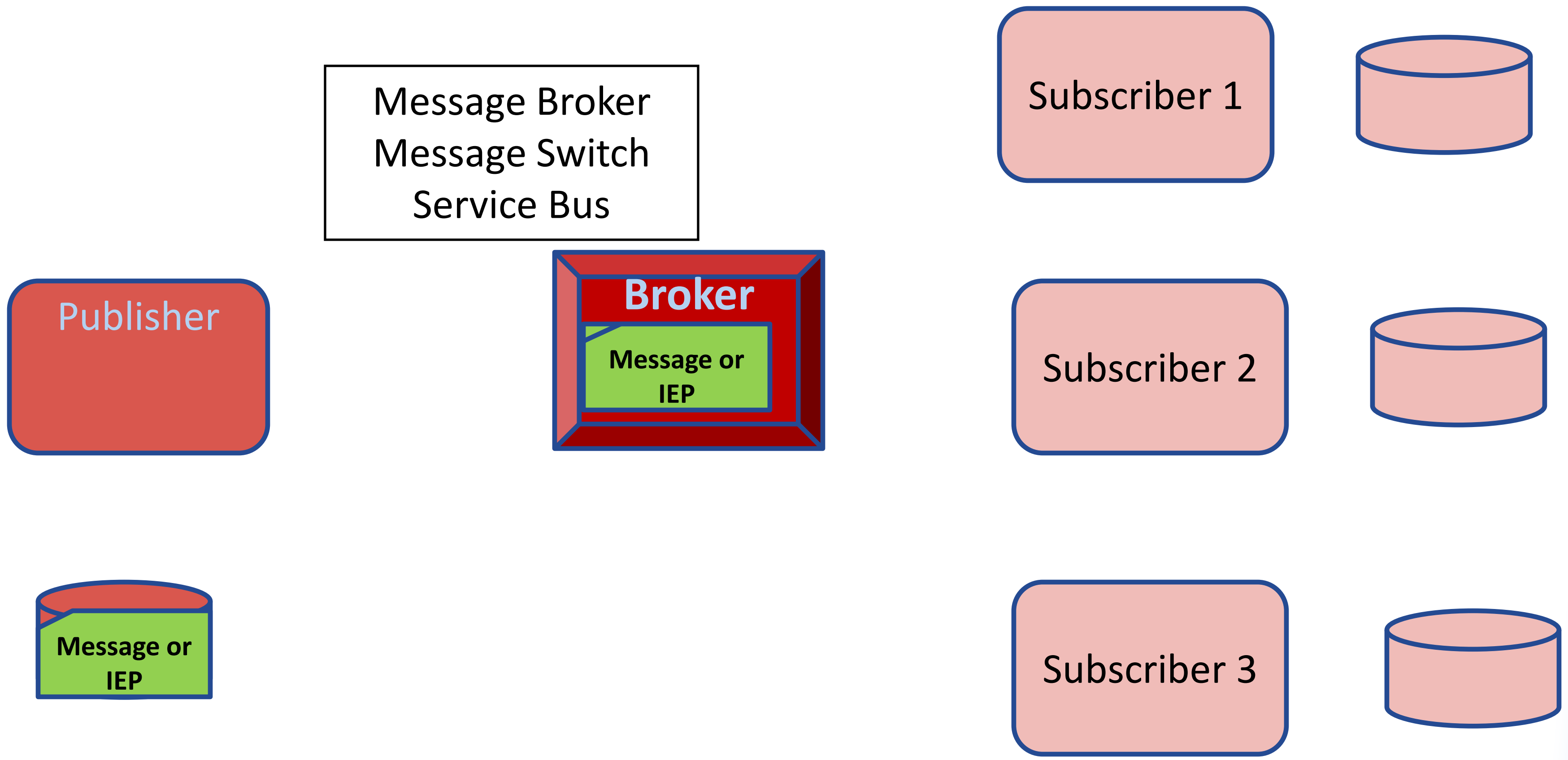
Elements of a one-way "2-party" exchange



XML Message Exchange Patterns

- "Publish / Subscribe" exchange
  - Single Message "Pushed" by the Publisher.
  - Delivered to one or more Subscribers.
  - Can be transactional or batch.
  - Transport neutral (Web Service, FTP, E-mail, etc.).
  - Protocol Acknowledgements.
  - Very scalable - Publishing component is insulated from subscribers.
  - Only sends (1) "Fire and Forget" message…

Publish / Subscribe Exchange

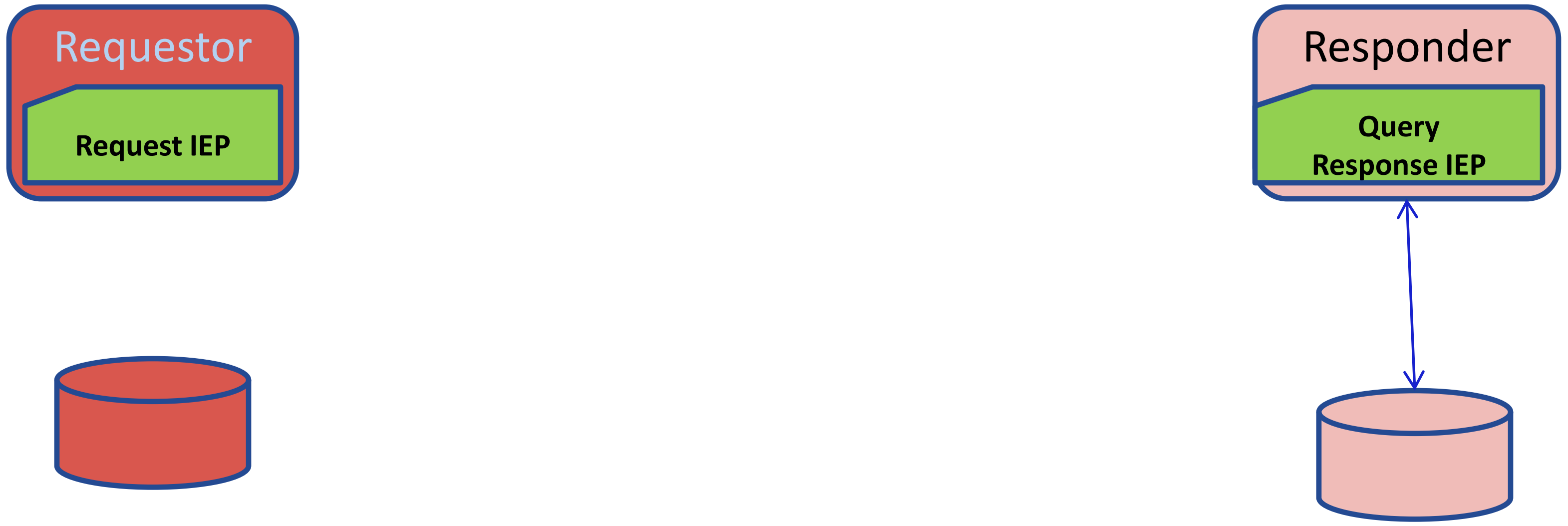


Broker device insulates Publisher from diverse subscriber interfaces

XML Message Exchange Patterns

- Two-way exchange (Request / Response)
  - A “Requestor” sends an XML message requesting certain specific information.
  - A “Responder” replies with an XML message containing the requested information.
    - (Example: results of a query or “next case #”)
  - Typically implemented via Web Services.
  - Typically synchronous response.

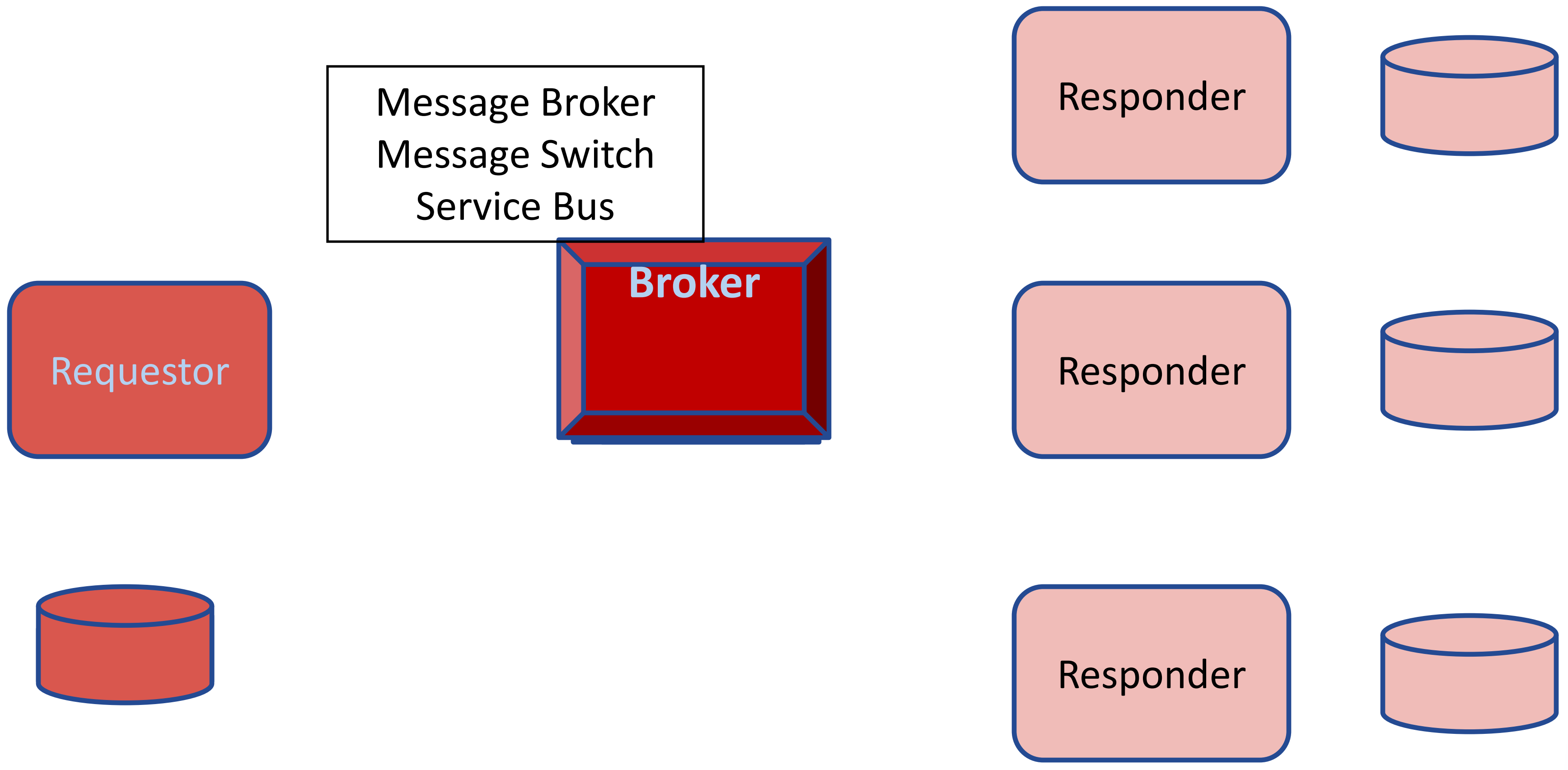
Elements of a Request / Response Exchange



XML Messsage Exchange Patterns

- Federated Query
  - A single request message may yield numerous response messages.
  - Not all respondents may have data for every request.
  - Typically built using a "Message Broker" device.
    - Broker is aware of (or can source) all possible responders, Requestor is insulated.
    - Broker aggregates multiple responses to requestor.

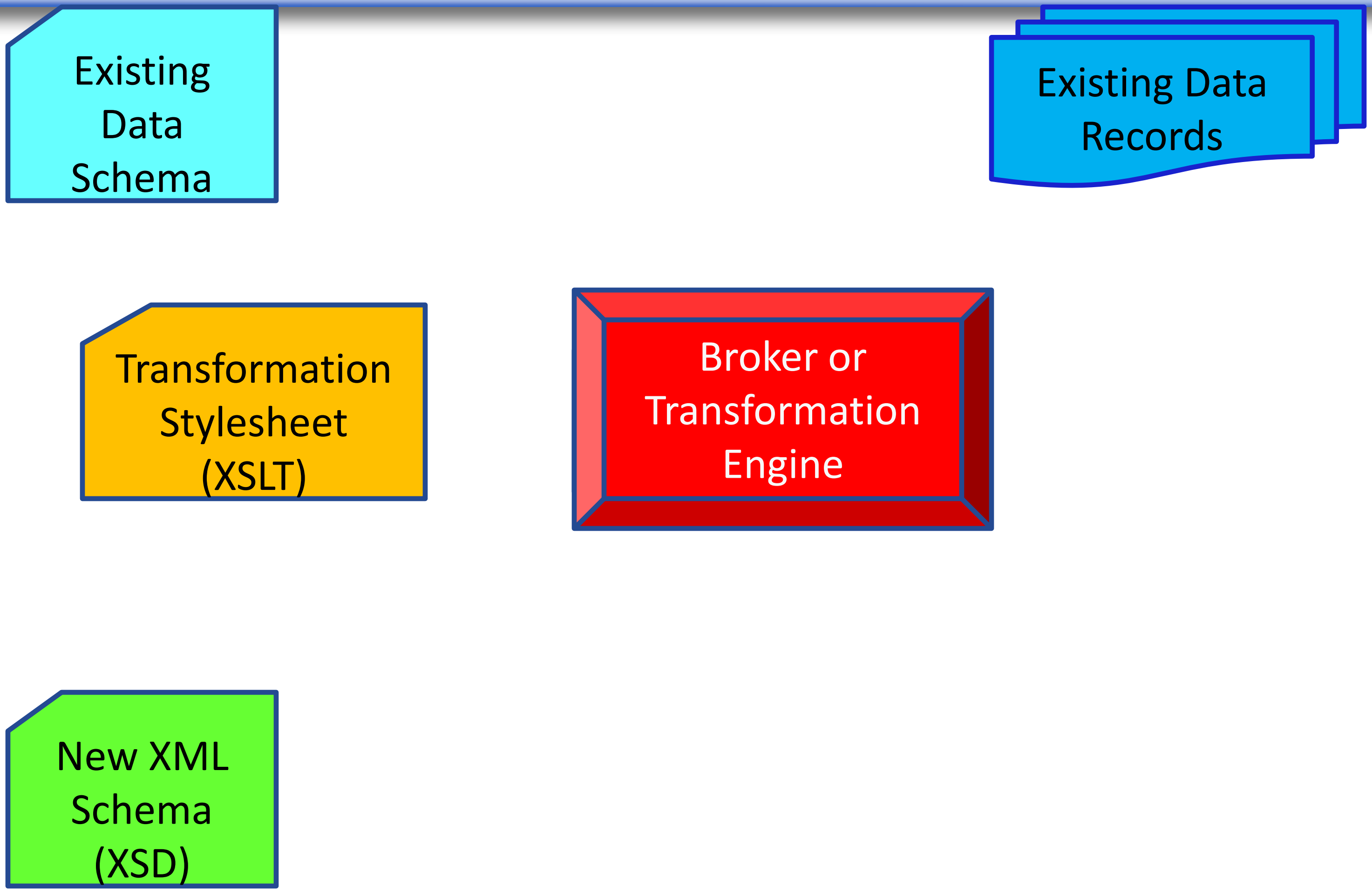
Federated Query Exchange



Interfacing to Existing Systems

- XML Exchanges are ***designed*** for interoperability.
- Many tools available for working with XML in almost any SDK environment.
- Developers can write code (better performance) or use a transformation tool or broker device (quicker to deploy and easier to maintain).

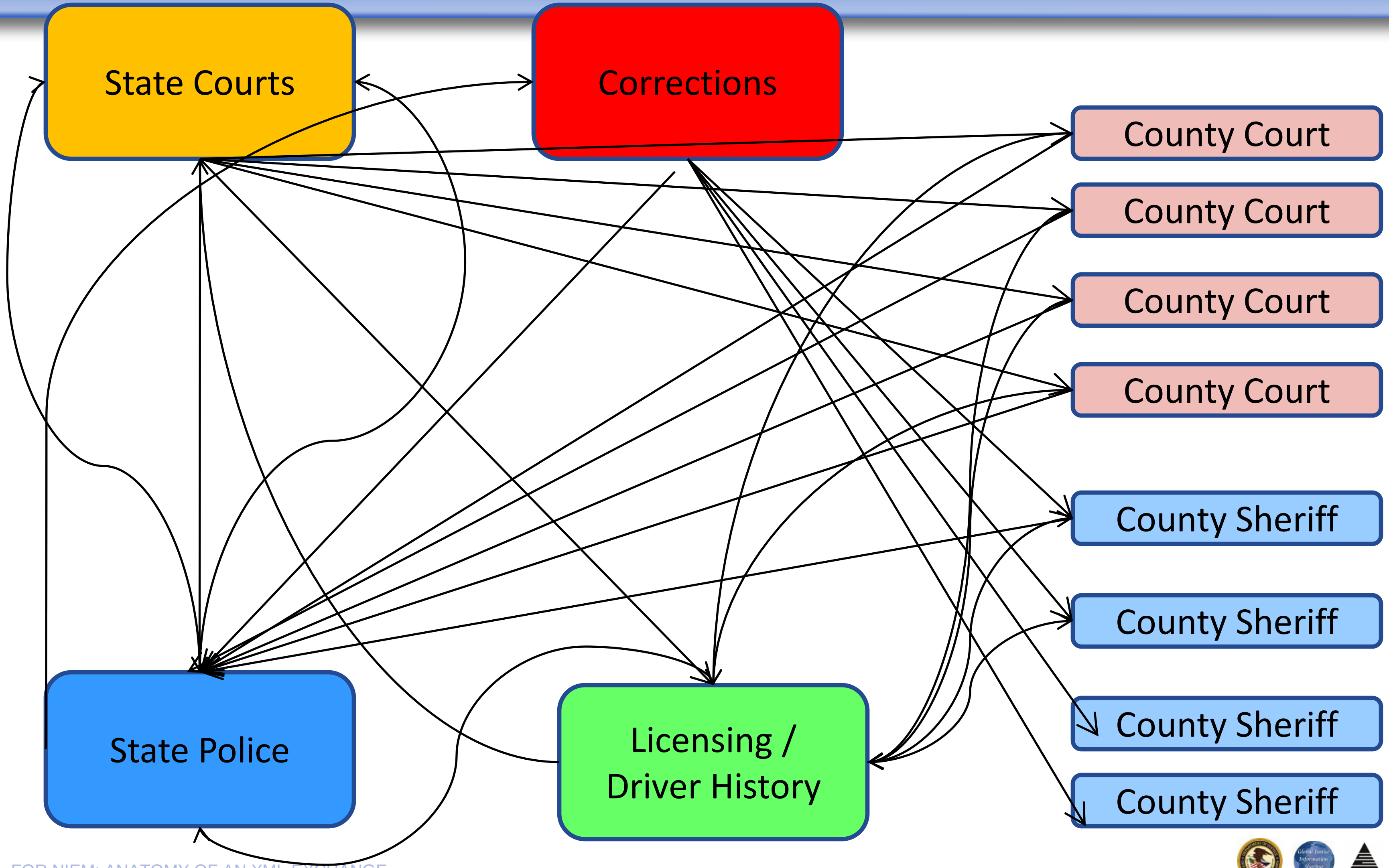
Simple Data Transformation


Existing Data Schema
Existing Data Records
Transformation Stylesheet (XSLT)
Broker or Transformation Engine
New XML Schema (XSD)

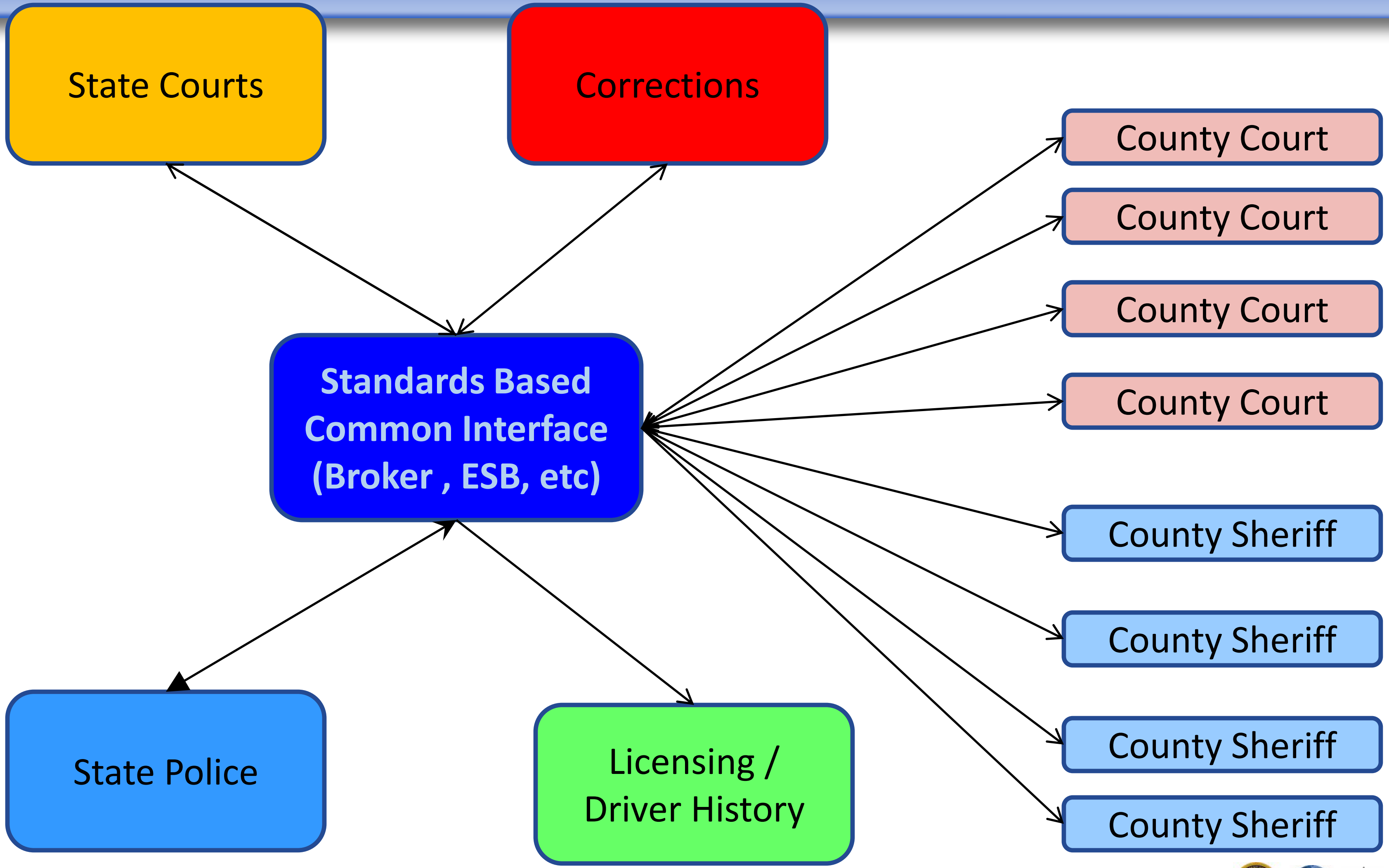
Common Design Challenges

- Often driven by specific initiative.
- Enterprise Architecture under-funded or deferred.
- Rogue Design elements introduced.
- Early decisions (or non-decisions) shape the architecture for years to come.

Accidental Design



Thoughtful Design



Module Summary

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